WHAT IS CLAIMED IS:

1. A diffractive optical element, comprising:

a substrate having a surface relief pattern formed on a first side thereof; and

an anti-reflection coating formed on the surface relief pattern, thereby forming a coated surface relief pattern with substantially the same dimensions as the surface relief pattern formed on the substrate.

2. The diffractive optical element of claim 1, wherein the substrate is a semiconductor material.

3. The diffractive optical element of claim 1, wherein the diffractive optical element is a transmission grating.

4. The diffractive optical element of claim 1, wherein the anti-reflection coating is a dielectric material.

5. The diffractive optical element of claim 4, wherein the anti-reflection coating is selected from the group consisting of silicon nitride, titanium dioxide, and silicon dioxide.

6. The diffractive optical element of claim 1, wherein the anti-reflection coating is applied by a directional deposition technique.

7. The diffractive optical element of claim 1, wherein the surface relief pattern formed on the substrate includes a first set of surfaces that are each substantially parallel to a longitudinal plane of the substrate, and a second set of surfaces that are each substantially perpendicular to the longitudinal plane, and wherein each of the surfaces in the second set includes a surface portion that is substantially free from the anti-reflection coating.

8. The diffractive optical element of claim 7, wherein each of the surfaces in the first set is substantially covered by the anti-reflection coating.

9. A method of forming a substantially anti-reflective diffractive optical element, comprising:

providing a substrate;

forming a surface relief pattern on a first side of the substrate; and

directionally depositing an anti-reflection coating on the surface relief pattern, thereby substantially maintaining dimensions of the surface relief pattern.

10. The method of claim 9, wherein the substrate is a semiconductor material.

11. The method of claim 9, wherein the anti-reflection coating is a dielectric material.

12. The method of claim 11, wherein the anti-reflection coating is selected from the group consisting of silicon nitride, titanium dioxide, and silicon dioxide.

13. The method of claim 9, wherein the anti-reflection coating is deposited by evaporation.

14. The method of claim 13, wherein the anti-reflection coating is deposited by electron beam evaporation.

15. The method of claim 9, wherein the anti-reflection coating is deposited by sputtering.

16. A diffractive optical element, comprising:

a substrate having a first side with a plurality of light diffracting features, the light diffracting features each having a width dimension parallel to a longitudinal plane of the substrate; and

an anti-reflection coating formed on the first side of the substrate, thereby forming a plurality of coated light diffracting features, the coated features each having a width dimension that is substantially the same as the width dimension of a corresponding one of the light diffracting features of the substrate.

17. The diffractive optical element of claim 16, wherein the substrate is a semiconductor material.

18. The diffractive optical element of claim 16, wherein the anti-reflection coating is a dielectric material.

19. The diffractive optical element of claim 16, wherein the anti-reflection coating is applied by a directional deposition technique.

20. The diffractive optical element of claim 16, wherein the plurality of light diffracting features of the substrate include a first set of surfaces that are each substantially parallel to the longitudinal plane of the substrate, and a second set of surfaces that are each substantially perpendicular to the longitudinal plane, and wherein each of the surfaces in the second set includes a surface portion that is substantially free from the anti-reflection coating.